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Original articles

The relationship between dysphagia and clinical and cognitive aspects in elderly patients presented with dementia

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ABSTRACT

Objective: to relate the risk of dysphagia and aspects of eating behavior to the cognitive aspects of elderly people with dementia.

Methods: 35 elderly patients with Alzheimer or vascular dementia were submitted to clinical and cognitive assessments as well as to a questionnaire for assessing appetite/eating disorder and the Dysphagia Risk Evaluation Protocol (DREP). Appropriate statistical tests were applied adopting a significance level lower than 0.05.

Results: mild dementia occurred in 16 cases, moderate, in 14, and severe, in 5. Complaints of choking/coughing in the medical history, and signs of dysphagia in the DREP, occurred in 9 and 25 elderly patients, respectively, with no differences regarding the type and severity of dementia. Patients presented with dysphagia and alterations in the oral and pharyngeal phases of DREP, were older. Alterations in the pharyngeal phase were associated with poorer performance in the Mini-Mental State Examination (total score, attention/calculation, language). Changes in appetite/weight/eating habits were associated with signs of dysphagia, increasing severity of dementia and functional impairment.

Conclusion: choking/coughing and signs of dysphagia were high. Changes in appetite/weight/eating habits were related to the severity of dementia and presence of dysphagia, and cognitive disorders and old age were associated with dysphagia.

Keywords: Dementia; Deglutition Dosorders; Cognition

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INTRODUCTION

During the aging process, the elderly may undergo functional and/or structural changes in swallowing, which can lead to difficulty in eating and complications such as malnutrition, dehydration and increased risk of aspiration pneumonia and mortality[1-3]. Epidemiological studies describe alterations in swallowing in 13 to 40% of the elderly population[1,4,5].

In elderly people with dementia, the presence of dysphagia is frequent, affecting 28 to 45% of the elderly. It occurs due to difficulties in attention, initiative, planning and execution of everyday activities related to the eating process and it is associated with anatomical and functional alterations in the cortical and subcortical regions related to swallowing and eating[6,7].

The clinical evaluation of swallowing allows the identification of possible causes of dysphagia, assessing the swallowing safety, as well as the risk of aspiration, deciding[8,9].

From the clinical evaluation, which is a subjective assessment, performed by speech therapist, to follow up oropharyngeal dysphagia, the need for objective instrumental assessment, i.e., nasolaringofibroscopy or swallowing videofluoroscopy[10].

Despite the relevance of the theme, there are still gaps in knowledge of aspects of swallowing and the relationship between dysphagia and clinical and cognitive aspects in elderly people with dementia. Studies using the Dysphagia Risk Evaluation Protocol (DREP)[11] are scarce.

The hypothesis of this study is that the progression of alterations in swallowing and eating is related to the greater cognitive impairment in cases of dementia.

Thus, the aim of this study was to assess the risk of dysphagia and aspects of swallowing and eating in the elderly with dementia, and relate them to clinical and cognitive aspects.

METHODS

The project was approved by the Human Research Ethics Committee of PUC-Campinas, SP, Brazil (Report no. 1584695 - CAAE 5645081690000548). All participants and/or persons responsible for them signed a free and informed consent form.

This is a cross-sectional, descriptive and exploratory study, with quantitative analysis.

Participants

The study consisted of 35 elderly patients, aged 65 years and older, diagnosed with Alzheimer's disease (AD) and vascular dementia (VD), who sought treatment at the Neurology Clinic of the Hospital PUC-Campinas. Diagnosis of dementia was performed by LCF in accordance with the Diagnostic and Statistical Manual of Mental Disorders[12], the recommendations of the European Federation of Neurological Societies[13] and the Brazilian Academy of Neurology[14]. Staging of dementia severity was determined using the Clinical Dementia Rating (CDR)[15,16].

The elderly were recruited during their routine medical consultation at the neurology outpatient clinic and invited to participate in the study. Patients who were unable to take liquids and food by mouth, according to the caregiver or responsible, as well as those who refused to participate, presented with other serious diseases, or were unable to respond to the instruments of cognitive assessment were excluded.

Procedures

For clinical and cognitive assessment:

- Interview with the patient and caregiver to collect sociodemographic data (age, gender and level of education);
- Neurological and cognitive assessments: Data from exams were collected from the hospital records and the following cognitive battery tests were applied: Mini-Mental State Examination (MMSE)[17,18] and Category fluency test (animals in one minute) (VF animals)[14], CDR[15,16];
- Pfeffer Functional Activities Questionnaire (FAQ)[19,20]: it is a 10-item instrument that assesses the functional autonomy of patients in everyday life activities. The score ranges from 0 (normal) to 30 (dependent); the higher the score, the greater the functional dependence of the patient. The caregiver answered the questionnaire;
- Neuropsychiatric Inventory-Clinician Rating (NPI-C)[21,22]: Questions soleley regarding appetite and eating disorders over the last four weeks were used. a) Has the patient lost appetite? b) Did the patient present an increase in appetite?; c) Did the patient lose weight? d) Did the patient gain weight?; e) Did the patient present changes in eating behavior, such as quantity per mouthful?; f) Did the patient change preference for types of food, such

as wanting to eat too much candy or other specific types of food?; g) Did the patient present changes in eating behavior such as wanting to eat exactly the same foods?; h) The patient eats or drinks inappropriate substances or non-food products; i) Does the patient frequently ask for food and/or beverage even if he or she has just eaten? Data were tabulated with "yes" or "no" answers. The inventory was answered by the caregiver.

For dysphagia assessment:

- Interview conducted with the patient and the caregiver to collect data on clinical aspects related to the presence of complaints of choking and/or coughing, speech disorders, dyspnea and episodes of recurrent pneumonia;
- Prior to the application of the protocol, the examiners confirmed if the elderly understood that they should swallow saliva and the presence of cough reflex.
- Dysphagia Risk Evaluation Protocol (DREP)[11]: One of the objectives of the Dysphagia Risk Evaluation Protocol (DREP) is to identify and characterize clinical signs, as well as the severity of dysphagia[11]. The protocol consists of: a) water swallowing test (11 items); b) swallowing test of pasty food (12 items). In this study, the phases of oral and pharyngeal deglutition were considered. For the oral phase, the following items were considered: anterior oral escape, oral transit time, swallowing quantity and residues in oral cavity. In the pharyngeal phase the following items were considered: laryngeal elevation, nasal reflux, coughing, choking, vocal quality, cervical auscultation, oxygen saturation, and other vital signs (cyanosis and bronchospasm). To ensure patient safety the protocol was initiated by introducing pasty food and then liquid. For the pasty food swallowing test, a 10 milliliter (ml) syringe was used to administer the pasty food in increments of 3 ml, 5 ml and 10 ml. After the fraction of the pasty food, it was placed on a dessert spoon and the patient was instructed to ingest the food from the spoon and swallow. For the water swallowing test, 1 to 5 ml of water was gradually delivered in a syringe and the elderly were instructed to suck water from the syringe while the examiner pushed the plunger gently. The following equipment was used for the protocol: stethoscope, pulse oximeter and vital signs monitoring equipment, 15 ml of water, 54 ml of fine pasty food (thickened with instant food thickener), 5 ml and 10 ml syringes, and a dessert spoon. In this study, the cases were classified as with or without dysphagia.

Statistical analysis

The occurrence and risk of dysphagia (clinical history and DREP data), aspects of swallowing and diet, were evaluated in elderly with AD and VD. Dysphagia data were related to clinical, functional, cognitive, behavioral aspects, the presence of neuropsychiatric symptoms and the severity of dementia using statistical tests appropriate to each situation.

Quantitative variables were expressed as means and standard deviations (SD) and qualitative variables were expressed as frequency and percentage values (%). Two-tailed Student's *t*-test was applied to compare continuous variables, while Fisher's exact test or Pearson's chi-squared test were used to compare qualitative data and frequencies of occurrence. The verification of possible associations among the quantitative variables was estimated using the Pearson correlation coefficient.

The data were treated by the software IBM SPSS Statistics, version 22. The significance level was set at $p<0.05$.

RESULTS

A total of 35 elderly patients were included, of which 24 patients (68.6%) with AD and 11 (31.4%) elderly with VD. The sociodemographic, clinical and cognitive data, the degree of severity of dementia, the total CDR and FAQ scores, and the presence of choking and/or coughing complaints in the medical history, according to the type of dementia, are shown in Table 1.

When the severity of dementia was evaluated, a higher occurrence of mild dementia was observed in the elderly with VD and moderate dementia in the AD group. Age was significantly higher in the AD group when compared with the age of the elderly with VD (Table 1).

The presence of choking and/or coughing in the medical history occurred in nine (25.7%) cases. There was no significant difference in the occurrence of choking and/or coughing according to the type of dementia, age and performance in the cognitive assessment.

Table 1. Sociodemographic, clinical and cognitive aspects and the occurrence of complaints of coughing or choking, according to the type of dementia

	AD (n=24)	VD (n=11)	p
Age (years)	80.5 (± 7.9)	70.9 (± 7.9)	**0.003[a]***
Sex: Women/Men	15/9	4/7	0.273[b]
Level of education (years)	1.9 (±0.6)	2.4 (±0.8)	0.10[a]
Disease duration (years)	3.4 (±2.6)	3.8 (±3.0)	0.714[a]
MMSE (total score)	13 (6.4)	17 (±6.2)	0.092[a]
VF animals	5.5 (±3.2)	6 (±2.1)	0.624[a]
FAQ	24.4 (±5.6)	19.5 (±7.8)	0.083[a]
CDR (total score)	1.8 (±0.6)	1.2 (±0.6)	**0.02[a]***
CDR: Classification			
Mild (n=16)	7 (29.1%)	9 (81.8%)	
Moderate (n=14)	13 (54.1%)	1 (9.1%)	0.013[c]*
Severe (n=5)	4 (16.6%)	1 (9.1%)	
Complaints of coughing/choking: yes/no	5/19	4/7	0.416[c]

AD: Alzheimer's disease; VD: vascular dementia (VD); MMSE: Mini-Mental State Examination; VF animals: Category fluency test; FAQ: Pfeffer Functional Activities Questionnaire; CDR: Clinical Dementia Rating. [a]: *t*-test; [b]: Chi-square test; [c]: Fisher's exact test; *$p<0.05$.

Swallowing: clinical data and DREP

The DREP revealed dysphagia in 25 (71.4%) elderly, 21 in the oral phase and 22 in the pharyngeal phase. There was no significant difference in the occurrence of changes in DREP, according to the type of dementia. The elderly with greater severity of dementia in the CDR presented a significantly longer oral transit time with water, higher laryngeal elevation with water and pasty food, changes in cervical auscultation with water and alteration in oxygen saturation with pasty foods (Table 2).

Table 2. Changes in the Dysphagia Risk Evaluation Protocol, according to type and severity of dementia

	Type of dementia			CDR			
	AD (n=24)	VD (n=11)	p	Mild	Moderate	Severe	p
Oral phase	14 (58.3%)	7 (63.3%)	1.0[a]	9	8	4	0.614[b]
Anterior oral escape (water)	7 (29.1%)	3 (27.2%)	1.0[a]	3	5	2	0.490[b]
Anterior oral escape (pasty food)	-	-		-	-	-	
Oral transit time (water)	4 (16.6%)	2 (18.1%)	1.0[a]	1	2	3	**0.019[b]***
Oral transit time (pasty food)	4 (16.6%)	4 (36.3%)	0.226[a]	3	3	2	0.606[b]
Number of swallowings (water)	11 (45.8%)	4 (36.3%)	0.721[a]	5	7	3	0.412[b]
Number of swallowings (pasty food)	12 (50%)	5 (45.4%)	1.0[a]	6	8	3	0.482[b]
Residue in oral cavity	2 (8.3%)	-		-	2	-	0.204[b]
Pharyngeal phase	16 (66.6%)	6 (54.5%)	0.708[a]	8	9	5	0.179[b]
Reflux (water and pasty food)	-	-		-	-	-	
Laryngeal elevation (water)	10 (41.6%)	4 (36.3%)	1.0[a]	3	8	3	**0.036[b]***
Laryngeal elevation (pasty food)	11 (45.8%)	-	0.721[a]	3	8	4	**0.02[b]***
Coughing (water)	4 (16.6%)	3 (27.2%)	0.652[a]	2	3	2	0.400[b]
Coughing (pasty food)	5 (20.8%)	3 (27.2%)	0.685[a]	3	4	1	0.700[b]
Choking (water and pasty food)	-	-		-	-	-	
Vocal quality (water)	11 (45.8%)	4 (36.3%)	0.721[a]	5	6	4	0.157[b]
Vocal quality (pasty food)	10 (41.6%)	3 (27.2%)	0.478[a]	4	7	2	0.364[b]
Cervical auscultation (water)	-	1 (9%)	0.314[a]	-	-	1	**0.046[b]***
Cervical auscultation (pasty food)	-	-		-	-	-	
Oxygen saturation (water)	1 (4.1%)	1 (9%)	0.536[a]	1	1	-	1.0[b]
Oxygen saturation (pasty food)	-	1 (9%)	0.314[a]	-	-	1	**0.046[b]***
Cyanosis, bronchospasm (water)	-	2 (18.1%)	0.092[a]	-	1	1	0.489[b]
Cyanosis, bronchospasm (pasty food)	-	2 (18.1%))	0.092[a]	-	1	1	0.489[b]
Dysphagia	17 (70.8%))	8 (72.7%))	1.0[a]	10	10	5	0.454[b]

AD: Alzheimer's disease; VD: vascular dementia; [a]: Fisher's exact test; [b]: Chi-square; *$p<0.05$.

The elderly who had complained of choking and/or coughing in the medical history presented significant changes in the pharyngeal phase - vocal quality (water) (n = 7 vs 2, Fisher's exact test, p = 0.022).

Presence of dysphagia and changes in the oral and pharyngeal phases of DREP was significantly more frequent in older individuals (Table 2).

Signs suggestive of dysphagia were significantly associated with changes in the oral and pharyngeal phases in the DREP (Table 3).

DREP data (presence of dysphagia and results of oral and pharyngeal phases) according to cognitive and functional sociodemographic aspects are shown in Table 3.

The elderly with signs of dysphagia and alterations in the oral and pharyngeal phases of DREP were older when compared with those without alterations. There was no significant difference in the occurrence of dysphagia in the DREP, according to gender, disease duration, VF animals scores and FAQ.

Lower cognitive performance in MMSE was significantly more frequent in the elderly with pharyngeal phase change in DREP (Table 3). The cognitive performance data according to the presence of change in DREP are shown in Table 4.

The elderly who presented pharyngeal changes in 'other vital signs' (cyanosis and bronchospasm) with water and pasty food presented significantly higher scores in the FAQ (presence of functional impairment) (n = 33 x 2, 22.5 (± 6.7) x 29.0 (± 1.4), *t*-test, p = 0.007).

Table 3. Dysphagia Risk Evaluation Protocol results, according to sociodemographic, cognitive and behavioral aspects

	Oral phase			Pharyngeal phase			Signs of dysphagia		
	Normal (n=14)	Altered (n=21)	p	Normal (n=13)	Altered (n=22)	p	Absent (n=10)	Present (n=25)	p
Signs of dysphagia (DREP)									
No	10	0	**<0.000***	10	0	**<0.000***	-	-	
Yes	04	21		03	22		-	-	
Gender									
Men	8 (50%)	8 (50%)	0.317[a]	6 (37.5%)	10 (62.5%)	1.0[a]	5	11	1.0[c]
Women	6 (31.5%)	13 (68.3%)		7 (36.8%)	12 (63.1%)		5	14	
Age (years)	73.7 (±8.3)	80.2 (±8.6)	**0.024[b*]**	72.9 (±9.6)	80.2 (±7.6)	**0.03[b*]**	70.5 (±9.5)	79.5 (±8.4)	**0.039[b*]**
MEEM									
Temporal Orientation	1.1 (±1.0)	1.2 (±1.7)	0.845[b]	1.7 (±1.6)	0.8 (±1.3)	0.107[b]	1.4 (±1.1)	1.1 (±1.6)	0.577[b]
Space Orientation	3.5 (±1.6)	2.8 (±1.7)	0.236[b]	3.5 (±1.7)	2.8 (±1.6)	0.241[b]	3.6 (±1.7)	2.8 (±1.6)	0.285[b]
Instant Memory	2.7 (±0.6)	2.2 (±1)	0.109[b]	2.7 (±0.5)	2.2 (±1)	0.063[b]	2.7 (±0.6)	2.3 (±1.0)	0.212[b]
Attention and calculation	1.2 (±1.6)	0.5 (±1.2)	0.232[b]	1.7 (±2.0)	0.2 (±0.4)	**0.02[b*]**	0.5 (±1.2)	1.2 (±1.6)	0.232[b]
Evocation	0.5 (±1)	0.6 (±1)	0.797[b]	0.76 (±1.1)	0.5 (±0.9)	0.565[b]	0.7 (±1.2)	0.6 (±0.9)	0.824[b]
Language	6.5 (±1)	5.4 (±2.4)	0.098[b]	6.6 (±0.9)	5.4 (±2.3)	**0.031[b*]**	6.6 (±0.9)	5.6 (±2.2)	0.079[b]
Drawing by Copy	0.2 (±0.4)	0.1 (±0.4)	0.870[b]	0.3 (±0.4)	0.1 (±0.3)	0.276[b]	0.3 (±0.4)	0.1 (±0.3)	0.425[b]
Total score	15.8 (±4.9)	13.1 (±7.3)	0.209[b]	17.6 (±6.3)	12.2 (±5.9)	**0.021[b*]**	16.8 (±5.6)	11.2 (±6.7)	0.127[b]
VF animals	6.4 (±2.3)	5.1 (±3.1)	0.198[b]	6 (±2.3)	5.5 (±3.2)	0.604[b]	6.4 (±2.5)	5.4 (±3)	0.330[b]
FAQ	23.1 (±5.4)	22.7 (±7.5)	0.864[b]	21.3 (±6.6)	23.8 (±6.7)	0.285[b]	22.4 (±4.7)	23.1 (±7.4)	0.737[b]

DREP: Dysphagia Risk Evaluation Protocol; MMSE: Mini-Mental State Examination; VF animals: Category fluency test; FAQ: Pfeffer Functional Activities Questionnaire; [a]: Fisher's exact test; [b]: *t*-test; [c]: Chi-square; *$p<0,05$.

Table 4. Cognitive performance, according to the presence of changes in the Dysphagia Risk Evaluation Protocol

	MMSE			
	N. (normal vs altered)			p
Laryngeal elevation (water)	21 x 14	Temporal orientation	1.6 (±1.7) x 0.5 (±0.7)	**0.021***
	21 x 14	Attention and calculation	1.2 (±1.7) x 0.2 (±0.4)	**0.016***
	21 x 14	Language	6.5 (±1.8) x 4.9 (±2.0)	**0.026***
	21 x 14	Total score	16.4 (±6.6) x 10.9 (±4.9)	**0.008***
Laryngeal elevation (pasty food)	20 x 15	Temporal orientation	1.7 (±1.7) x 0.5 (±0.7)	**0.012***
	20 x 15	Spatial orientation	3.6 (±1.5) x 2.4 (±1.6)	**0.039***
	20 x 15	Immediate Memory	2.7 (±0.6) x 2.0 (±1.1)	**0.032***
	20 x 15	Attention and calculation	1.3 (±1.7) x 0.2 (±0.4)	**0.013***
	20 x 15	Language	6.8 (±1.0) x 4.6 (±2.3)	**0.003***
	20 x 15	Total score	17.3 (±5.6) x 10.2 (±5.5)	**0.001***
Coughing (water)	28 x 7	Evocation	0.9 (±1.5) x 0.2 (±0.4)	**0.001***
Coughing (pasty food)	27 x 8	Attention and calculation	1.0 (±1.5) x 0.2 (±0.4)	**0.038***
Cyanosis, bronchospasm (water)	33 x 2	Temporal orientation	1.2 (±1.5) x 0.0 (±0.0)	**<0.000***
	33 x 2	Attention and calculation	0.8 (±1.4) x 0.0 (±0.0)	**0.002***
	33 x 2	Drawing of a pentagon	0.2 (±0.4) x 0.0 (±0.0)	**0.006***
Oxygen saturation (water)	33 x 2	Immediate Memory	3.0 (±0.0) x 2.3 (±0.9)	**0.001***
	33 x 2	Language	7.0 (±0.0) x 5.8 (±2.0)	**0.003***
Vocal quality (water)	20 x 15	Attention and calculation	1.3 (±1.7) x 0.2 (±0.4)	**0.013***
Vocal quality (pasty food)	22 x 13	Calculation and attention	1.2 (±1.6) x 0.1 (±0.3)	**0.008***
	22 x 13	Drawing of a pentagon	0.3 (±0.4) x 0.0 (±0.0)	**0.005***

MMSE: Mini-Mental State Examination *t*-test; *$p<0.05$.

Appetite and eating disorders

Table 5 shows the data regarding the occurrence of appetite and eating disorders in the NPI-C, according to the CDR, presence of signs suggestive of dysphagia, presence of alterations in the oral and pharyngeal phases in the DREP and scores in the FAQ.

Table 5. Questions on appetite and eating disorders of the Neuropsychiatric Inventory-Clinician Rating, according to the Clinical Dementia Rating, signs of dysphagia and oral and pharyngeal phases, in the Dysphagia Risk Evaluation Protocol and Functional Activities Questionnaire

	NPI-C								
	Changes in appetite, weight, eating habits			Changes in eating behavior			Frequent request of food and/or drink		
	No	Yes	p	No	Yes	p	No	Yes	p
CDR									
Mild	10	6		16	0		13	3	
Moderate	8	6	**0.044[a]***	14	0	**0.046[a]***	11	3	**0.023[a]***
Severe	0	5		04	1		1	4	
Signs of dysphagia									
Absent	9	9	**0.007[a]***	10	0	1.0[a]	9	16	0.21[a]
Present	1	16		24	1		1	9	
Oral phase									
Normal	10	4	0.086[a]	14	0	1.0[a]	11	3	0.704[a]
Altered	8	13		20	1		14	7	
Pharyngeal phase									
Normal	10	3	**0.003[a]***	13	0	1.0[a]	11	2	0.59[a]
Altered	8	14		21	1		14	8	
FAQ	22.5 (±6.7)	28.5 (±0.7)	**<0.000[b]***	22.7 (±6.7)	30.0	0.293[b]	21.5 (±7.3)	26.4 (±3.2)	**0.01[b]***

NPI-C: Neuropsychiatric Inventory-Clinician Rating; CDR: Clinical Dementia Rating; FAQ: Pfeffer Functional Activities Questionnaire; [a] Chi-square test; [b] *t*-test. *$p<0.05$.

Food/drink requests even after being recently fed was more significant in the elderly with severe dementia when compared with the elderly with mild or moderate dementia in the CDR.

Changes in appetite, weight or eating habits were observed in the elderly with signs of dysphagia in DREP, alteration in the pharyngeal phase of DREP, and in those with greater severity of dementia in the CDR.

Higher scores on the FAQ (presence of functional impairment) were associated with changes in appetite, weight or eating habits, and food/drink requests even after being fed in the NPI-C.

There was no significant difference in the occurrence of appetite disorders and food preference, according to the type of dementia.

DISCUSSION

This study assessed the eating and swallowing aspects in 35 consecutive elderly patients diagnosed with dementia (AD and VD), using the DREP and significant relationships between the impairment of eating and swallowing aspects with clinical and cognitive aspects were observed.

Complaints of choking and/or coughing in the medical history was observed in a quarter of the cases, but there was no relation with age, disease duration, severity and type of dementia. In a study with elderly in the community of the city of Campinas, SP, changes in swallowing were observed in 35.9% of the cases[5]. The presence of choking and/or coughing with solid and liquid foods and difficulty in swallowing tablets are reported by caregivers of elderly patients with dementia[3,22,23].

Swallowing: DREP

Signs suggestive of aspiration were elevated in the DREP in our sample. Dysphagia is a common symptom in dementia, ranging in accordance with the type, and it is more frequent in institutionalized elderly individuals[1,23,24]. Studies have described different values and patterns of disorders in the oral and pharyngeal phases of swallowing, which were probably related to the population studied and the screening methods used[5,7,25]. However, it is known that the clinical evaluation associated with videofluoroscopy presents greater sensitivity in the diagnosis of mild forms of dysphagia, in the assessment of the risk of tracheal aspiration and, thus, defining the prognosis and the therapeutic planning[26,27].

Dysphagia occurred significantly in older patients, suggesting that vulnerability to dysphagia is associated with changes related to age and clinical aspects of dementia[1,4,23,25,28].

Dysphagia was observed in the elderly with mild, moderate or severe dementia, but in our sample it occurred in all cases with severe dementia. Studies have suggested that changes in swallowing in the oral and pharyngeal phases may be present since the onset of the symptomatology of dementia[22,29] and the progression of disorders is associated with an aggravation of disease severity and health impairment of the elderly[29,30].

There was an association between dementia severity and longer oral transit time with water, higher laryngeal elevation with water and pasty foods, changes in cervical auscultation with water and alteration in oxygen saturation with pasty foods. It is well known that individuals are able to compensate for swallowing changes by swallowing slowlier and increase the number of swallowings of pasty food and liquids for complete swallowing[3,25,28].

Similar to the literature, the signs of aspiration were more frequent with water than with pasty food[30,31].

Greater severity of dementia, presence of signs of dysphagia in DREP, and alteration in the pharyngeal phase of DREP are associated with complaints of changes in appetite, weight or eating habits, suggesting that the worsening of dementia predisposes to eating disorders and swallowing[29-31].

Swallowing and cognitive aspects

The worst cognitive performance in screening tests of memory, language, praxis, orientation, attention, and executive functions was related to several aspects of swallowing, suggesting that there is a complex and reciprocal relationship between impairment of cognitive performance and swallowing disorders in dementia.

Studies have described that the cognitive deficits found in AD may lead to the interruption of the necessary and preparatory actions for swallowing[1,6]. Differently, other authors did not find any association between cognitive alteration and signs suggestive of dysphagia when evaluating institutionalized elderly women using the DREP[32].

Appetite and eating aspects

Complaints of changes in appetite, weight or eating habits, and the request for food and/or drink

even though having previously been fed have been observed in a great number of cases. It is known that several factors may be involved in the pathophysiology of weight reduction in the elderly with dementia, such as increased energy needs, absorption disorders, nutritional inadequacies, and low food intake[27,30]. Authors have described a high risk of malnutrition and loss of muscular reserve in anthropometric measurements, progressive impairment of nutritional variables associated with the evolution of the disease, and progressive impairment of cognitive aspects in patients with AD[33].

No differences were observed in the occurrence of eating alterations according to the type of dementia. Differently, other studies have described that changes in appetite are more prevalent in AD when compared with VD[28].

Eating disorders were associated with greater functional impairment, dementia severity, and occurrence of dysphagia, which may be associated with self-neglect, forgetting to eat, changes in smell and taste, loss of cognitive abilities, or loss of appetite[4,28,30,32]. However, there is still no consensus on the pathophysiological mechanisms involved in eating disorders and swallowing, which points to the importance of nutritional care in the elderly with dementia.

Study limitations

This study has some limitations. It is a study performed in a university hospital, but it is not a tertiary public health care center in Brazil. This study is cross-sectional, with a relatively small sample of cases, and the cases were not divided equally between the types of dementias. For dysphagia assessment, the clinical aspects of the complaint and DREP data were used, and objective complementary exams (videofluoroscopy, among others) were not used. However, objective and relevant data were obtained. Studies with larger samples are required to assess the impact of the findings of this study.

CONCLUSION

Complaints of choking and/or coughing in the medical history and the presence of signs of dysphagia in the DREP were high in our cohort. Changes in appetite/weight/eating habits were associated with dementia severity. Complaints of choking and/or coughing occurred at all ages and correlated with suggestive signs of dysphagia. Cognitive disturbances and old age were associated with the presence of altered swallowing function.

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